OCR
Oxford Cambridge and RSA

Science

OCR J816 Unit R074 Level 1/Level 2
Cambridge Nationals Certificate in Science
Unit Recording Sheet

Please read the instructions printed at the end of this form. **One** of these sheets, suitably completed, should be attached to the assessed work of **each** candidate.

Unit Title	**How scientists use analytical techniques to collect data**		**Unit Code**	**R074**	**Session**	**Year**	
Centre Name						**Centre Number**	
Candidate Name						**Candidate Number**	

Criteria			**Teacher Comments**	**Mark**	**Page No**
LO1: Be able to apply the principles of good laboratory practice					
MB1: 1 – 4 marks	**MB2: 5 – 7 marks**	**MB3: 8 – 10 marks**			
• Demonstrates a **basic** understanding and level of skill when preparing samples, standard solutions and carrying out calibrations • Significant teacher intervention needed to select and carry out the techniques required • **Basic** understanding of hazards and risks in procedures with only standard laboratory safety precautions identified • Significant teacher intervention required to ensure safety **or** help set up equipment • Procedures used for analyses are recorded; observations and measurements are recorded at a **basic** level • **Some** evidence of processing of quantitative data: o data presented as **simple** charts or graphs o use of **simple** mathematical techniques where appropriate • **Some** trends/patterns in the data identified • **Limited** comments made on the quality of data and procedures used **[1 2 3 4]**	• Demonstrates a **sufficient** understanding and level of skill when preparing samples, standard solutions and carrying out calibrations • **Independent** selection of techniques and **little support** needed to carry out the techniques required • **Some** hazards and risks in procedures identified, and **some** specific responses suggested to reduce risks • **Most** risks managed successfully with no significant incidents or accidents and no requirements for teacher intervention • **Sufficient** observations and measurements are recorded in an appropriate format • Main trend/patterns **described** with reference to quantitative data o **Some relevant** comments made about the quality of the data including accuracy and sources of error, linked to the methods of collection, limitations in the methods of data collection identified and suggestions for improvements given **[5 6 7]**	• Demonstrates a **thorough** understanding and level of skill when preparing samples and standard solutions and calibration • **Independently** carries out the appropriate techniques required • All significant hazards and risks **evaluated** and **reasoned** judgements made to reduce risks • All risks managed successfully with no incidents or accidents and no requirements for teacher intervention • Procedures used for analyses are described in **detail**, justifying the techniques used that will enable the collection of high quality data; observations and measurements are recorded with the necessary detail • Main trends/patterns in the data described in detail and interpreted correctly with reference to quantitative data and **relevant** scientific understanding. **Detailed** and **critical** consideration given to the data and methods used to obtain them: o sources of error and quality of data **discussed** and **explained**, including accuracy, repeatability and uncertainty, limitations of the method identified and suggestions for improvements **justified** **[8 9 10]**			

<table>
<tr><th colspan="3">Criteria</th><th>Teacher Comments</th><th>Mark</th><th>Page No</th></tr>
<tr><td colspan="3">LO2: Be able to separate and identify the substances present in a mixture</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>MB1: 1 – 4 marks</td><td>MB2: 5 – 7 marks</td><td>MB3: 8 – 10 marks</td></tr>
<tr><td>• When provided with method and equipment, significant support needed to set it up to take measurements
• Some measurements taken and recorded
• When provided with equation for calculating Rf values, some data processed correctly
• Types of chromatography to improve analysis of samples identified
[1 2 3 4]</td><td>• Independent selection of equipment to take measurements; little support required to set up correctly
• Measurements taken and recorded using an appropriate format
• Sufficient observations recorded; measurements taken and recorded using an appropriate format
• Support needed to process data using appropriate mathematical techniques; correct equation for calculating Rf values independently selected; some calculations carried out correctly and one outcome derived correctly
• Appropriate types of chromatography to improve analysis of samples described
[5 6 7]</td><td>• Independent selection of equipment to take measurements; equipment set up correctly
• Measurements taken and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units
• Data processed accurately using appropriate mathematical techniques; correct equation for calculating Rf values independently selected; calculations carried out correctly to appropriate numbers of significant figures
• Appropriate types of chromatography to improve analysis of samples described; benefits of their use explained and evaluated
[8 9 10]</td></tr>
<tr><td colspan="3">LO3: Be able to examine and record features of samples</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>MB1: 1 – 4 marks</td><td>MB2: 5 – 7 marks</td><td>MB3: 8 – 10 marks</td></tr>
<tr><td>• When provided with method and equipment, significant support needed to set it up to take measurements and make observations
• Some measurements taken and recorded
• When provided with the mathematical techniques to use, some calculations of magnification carried out correctly
• Types of instrumental analysis to enhance examination of samples identified
[1 2 3 4]</td><td>• Independent selection of equipment to make observations and take measurements; little support needed to set up correctly
• Sufficient observations recorded; measurements taken and recorded using an appropriate format
• Support needed to process data using appropriate mathematical techniques; correct equations for calculating magnification and scale independently selected; support needed to manipulate equations and convert units where necessary; some calculations carried out correctly and one outcome derived correctly
• Appropriate types of instrumental analysis to enhance examination of samples described
[5 6 7]</td><td>• Independent selection of equipment to take measurements; equipment set up correctly
• Measurements taken and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units
• Data processed accurately using appropriate mathematical techniques; correct equations for calculating magnification and scale independently selected and manipulated where necessary; scale or scale bars calculated correctly to appropriate numbers of significant figures, using appropriate units
• Appropriate types of instrumental analysis to enhance examination of samples described; benefits of their use explained and evaluated
[8 9 10]</td></tr>
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<tr><th colspan="3">Criteria</th><th>Teacher Comments</th><th>Mark</th><th>Page No</th></tr>
<tr><td colspan="3">LO4: Be able to identify cations and anions in samples</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>MB1: 1 – 4 marks</td><td>MB2: 5 – 7 marks</td><td>MB3: 8 – 10 marks</td></tr>
<tr><td>• When provided with method and equipment, significant support needed to carry out analyses
• Limited observations taken and recorded
• Types of instrumental analysis to enhance examination of samples identified
[1 2 3 4]</td><td>• Independent selection of equipment to carry out analyses; little support needed to set up correctly
• Sufficient observations recorded using an appropriate level of detail and in an appropriate format
• Types of instrumental technique to improve analysis of samples described
[5 6 7]</td><td>• Independent selection of equipment to carry out analyses; equipment set up correctly
• Observations made and recorded accurately and in detail, using an appropriate format
• Appropriate types of instrumental technique to improve analysis of samples described in detail; benefits of their use explained and evaluated
[8 9 10]</td></tr>
<tr><td colspan="3">LO5: Be able to determine the concentration of an acid or base using titration</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>MB1: 1 – 4 marks</td><td>MB2: 5 – 7 marks</td><td>MB3: 8 – 10 marks</td></tr>
<tr><td>• When provided with method and equipment, significant support needed to set it up to take measurements
• Some measurements taken and recorded
• When provided with equations, data substituted correctly and some calculations carried out correctly
• Instrumental technique to improve analysis of samples by titration identified
[1 2 3 4]</td><td>• Independent selection of indicator and equipment to take measurements; little support needed to set up correctly
• Sufficient observations recorded; measurements taken and recorded using an appropriate format
• Support needed to process data using appropriate mathematical techniques; correct equations independently selected; support needed to manipulate equations where necessary; some calculations carried out correctly and one outcome derived correctly
• Instrumental analysis technique to improve analysis of samples by titration described
[5 6 7]</td><td>• Independent selection of indicator and equipment to take measurements; equipment set up correctly
• Measurements taken and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units
• Data processed accurately using appropriate mathematical techniques; correct equations independently selected and manipulated where necessary; outcomes calculated correctly to appropriate numbers of significant figures
• Appropriate type of instrumental technique to improve analysis of samples by titration described in detail; benefits of its use explained and evaluated
[8 9 10]</td></tr>
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Criteria			Teacher Comments	Mark	Page No
LO6: Be able to determine the concentration of coloured substances in solution					
MB1: 1 – 4 marks	**MB2: 5 – 7 marks**	**MB3: 8 – 10 marks**			
• When provided with method, stock solutions and equipment, **significant support** needed to carry out procedure and to take measurements • **Some** measurements taken and recorded • Calibration curve drawn, with **some** errors in scales and in plotting points • Calibration curve used, with **significant support**, to determine the concentration of a substance in a solution • A type of instrumental technique to improve analysis of samples identified **[1 2 3 4]**	• **Independent** selection of equipment to take measurements; **little support** needed to carry out procedures correctly • Sufficient measurements taken and recorded • Calibration curve drawn, with suitable scales and minor errors only in plotting of points; **appropriate** line of best fit drawn • Calibration curve used, with **little support**, to determine the concentration of a substance in a solution • A type of instrumental technique to improve analysis of samples **described** **[5 6 7]**	• **Independent** selection of equipment to take measurements; equipment set up correctly • Measurements taken and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units • Calibration curve drawn, with suitable scales and **accurate** plotting of points; **appropriate** line of best fit drawn • Calibration curve used **independently** to determine the concentration of a substance in a solution, to **appropriate** numbers of significant figures • Appropriate type of instrumental technique to improve analysis of samples described in detail; benefits of its use **explained** and **evaluated** **[8 9 10]**			
				Total/60	**0**

If this is a re-sit, please tick		Session and Year of previous submission	Please tick to indicate this work has been standardised internally	

Please note: This form may be updated on an annual basis. The current version of this form will be available on the OCR website (www.ocr.org.uk).

Guidance on Completion of this Form

1 **One** sheet should be used for each candidate.
2 Please ensure that the appropriate boxes at the top of the form are completed.
3 Please enter *specific* page numbers where evidence can be found in the portfolio, and where possible, indicate to which part of the text in the mark band the evidence relates.
4 Circle the mark awarded for each strand of the marking criteria in the appropriate box and also enter the circled mark in the final column.
5 Add the marks for the strands together to give a total out of 60. Enter this total in the relevant box.